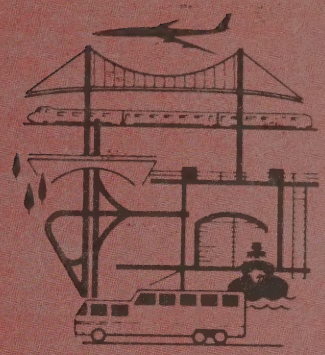
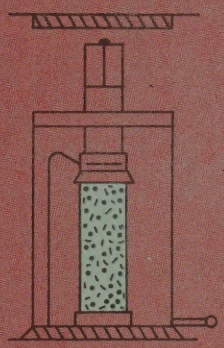
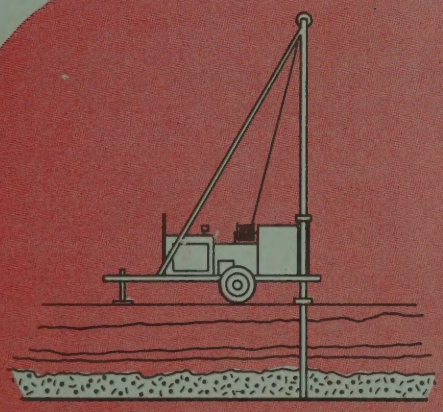
STATE OF NEW YORK
DEPARTMENT OF TRANSPORTATION

SOIL MECHANICS BUREAU

OCTOBER 1985

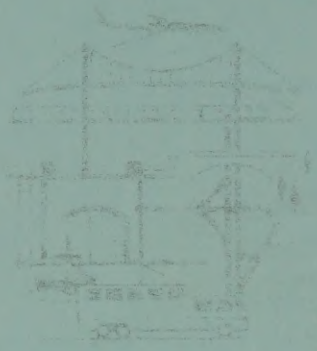


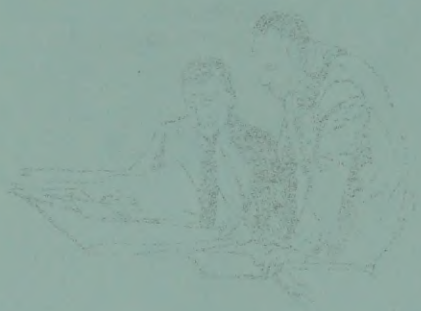


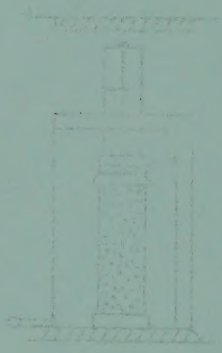


A User's Guide for
BMDP Statistical Software

SM 238b (1/73)







A USER'S GUIDE FOR BMDP STATISTICAL SOFTWARE

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OCTOBER 1985

ABSTRACT

An organized procedure is developed for implementing a statistical study on data using the Biomedical Statistical Software (BMDP). Selected BMDP programs are identified which are capable of executing statistical analyses that range from simple plots and data descriptions to high level statistical techniques. Following the guideline and reading the recommended material will help in determining the appropriate type of analyses and those programs in the BMDP group that are required to accomplish the task.

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INTRODUCTION

The BMDP Statistical Software is a collection of computer programs capable of performing statistical analyses that range from very basic to highly complex. However, before these programs can be implemented, the user must have a basic familiarity in the following areas:

1. Operating procedures and CANDE language instructions for the Burroughs B7900 12 Mega Byte system (DOT mainframe computer)
2. Basic concepts and terminology of Statistics
3. Types of analyses performed by BMDP programs
4. BMDP Control Language

The user must be familiar with the operating system instructions as well as the Command and Edit Language (CANDE) of the Burroughs B7900 mainframe computer. The CANDE language provides file preparation and editing capabilities and is a tool for initiating BMDP programs.

A statistical analysis can be neither defined nor implemented without a clear understanding of the fundamental concepts and terms of basic statistics. Time and effort must be invested in studying the "basics" if a quality analysis and an accurate interpretation are to be achieved.

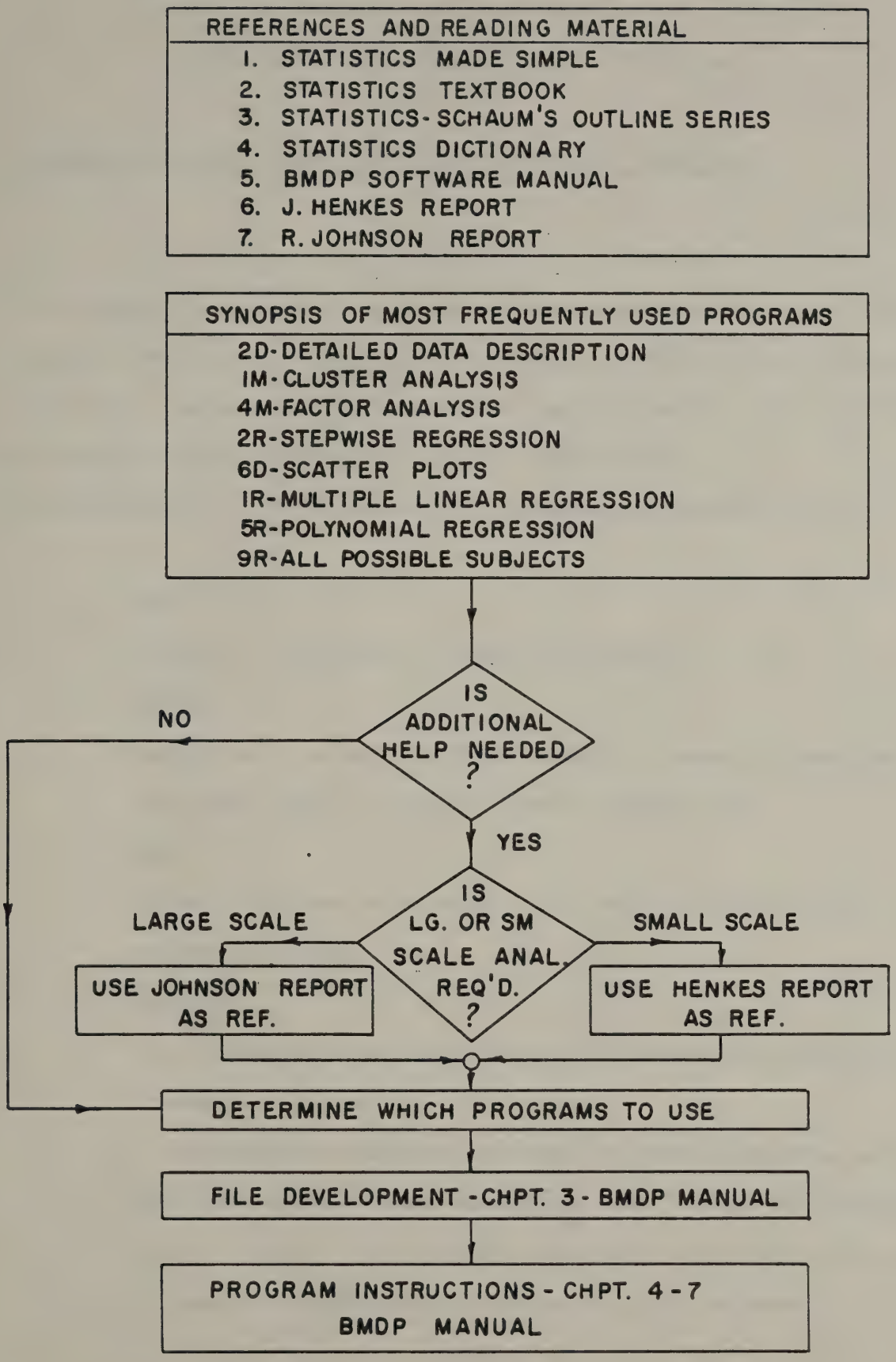
The BMDP programs are capable of performing approximately nine different analyses. The user should understand which program does what analysis before any analytical steps are taken using the data. This understanding will also result in better interpretation of the output.

The BMDP Control Language commands are instructions used by the programs to perform analyses. These commands are "set up" in files on the Burroughs system. A thorough understanding of these commands will help to utilize computer time efficiently as well as maximize the productivity of each run.

The objectives of this guide are to:

1. Provide an explanation of the most commonly used BMDP software.
2. Present suggestions of reading material and references.
3. Provide examples of BMDP SETUP files and Burroughs job files.

DIRECTIONAL CHART FOR UTILIZING BMDP SOFTWARE



SYNOPSIS OF MOST COMMONLY USED BMDP PROGRAMS

DETAILED DATA DESCRIPTION, INCLUDING FREQUENCIES (BMDP 2D)

This program computes the most commonly used statistics for each distinct value in the analysis. For first time users of BMDP, it is recommended that this program be run first for familiarization with the input procedures and output interpretation of a BMDP program.

The following are a few explanations of parameters calculated by 2D:

1. MEAN

   The mean is the sum of N numbers divided by N.

2. MEDIAN

   The median of a set of numbers arranged in order of magnitude is the middle value or the mean of the 2 middle values.

3. MODE

   The mode of a set of numbers is that value which occurs with the greatest frequency.

4. VARIANCE

   The variance is a measure of variation from the mean value and is a measure of dispersion.

   To determine the variance, the mean is subtracted from each of the data points. These values are then squared to eliminate negative values. The squared values are totaled and divided by the number of data points. The result is the variance.

5. STANDARD DEVIATION

The standard deviation is the square root of the variance.

BMDP 2D also helps identify, by use of its histograms and frequency counts, those outliers and/or errors in the data that may result in a meaningless analysis. Most of the univariate (one variable) descriptive statistics determined by this program are repeated in other BMDP programs.

Suggested Reading Material:

	Ref. No.	Page No.
BMDP Manual-Data Screening & Description	5	8
BMDP Manual	5	80 to 85
Johnson Report	6	Appendix III

CLUSTER ANALYSIS (BMDP 1M)

Clustering is a technique by which variables are joined into groups having similar parameters. This program clusters variables by their correlation coefficients. The correlation values are presented in matrix form in a manner that identifies those variables that are related to each other. The closer the value is to ±1.0, the closer the relation is between the variables. A cluster triangle is also presented. The user can determine groups of variables that have high correlations by viewing the grouping of symbols in this triangle. The clustering process is further defined in the tree diagram where the grouping at each step in the clustering process is shown.

Suggested Reading Material:

	Ref. No.	Page No.
BMDP Manual-Cluster Analysis	5	11
BMDP Manual	5	447 to 455
Johnson Report	6	18, 37

FACTOR ANALYSIS (BMDP 4M)

Where program 1M - CLUSTER ANALYSIS identifies groups of related variables, 4M - FACTOR ANALYSIS indicates what these relationships are within the respective groups. In factor analysis, the variables are identified as positions along an axis. The axis is called a factor and the position of the variable is the factor loading. When the loadings are plotted as coordinates of the factors, a vector is defined for a variable. The vectors will then graphically demonstrate the relationships among the variables.

Suggested Reading Material:	Ref. No.	Page No.
BMDP Manual	5	11 to 12, 480
Johnson Report	6	18, 63 to 67

STEPWISE REGRESSION (BMDP 2R)

A regression analysis studies the relationship between a dependent variable and one or more independent variables. When these variables are plotted in relation to one another, a regression line or curve is determined from the pattern the variables have formed. An equation for this curve or line is determined in the regression analysis. In linear regression where the data approximates a straight line, the equation determined will be in the form

$$y = a + bx \qquad (1)$$

where y is the dependent variable, x is the independent variable and a & b are constants determined from the regression analysis of y on x. Once the equation is determined, y can be estimated for any given value of x.

Stepwise Regression searches out the best linear relationship for a given set of variables. The user specifies the dependent variable and 2R computes the best linear regression in a stepwise manner. At each step, it enters into the regression equation the variable that best helps to predict y, or removes the least helpful variable. The criteria used for this entering and removal procedure are based on F- to-enter and F-to-remove

limits explained in the BMDP manual. At each step in this analysis the multiple R^2 value is determined. R^2 takes on a value of 1 when all observations fall directly on the fitted response surface.

Suggested Reading Material:

	Ref. No.	Page No.
BMDP Manual	5	9, 251-262
Johnson Report	6	18, 87, 88, 105,

SCATTER PLOTS (BMDP 6D)

6D presents plots of user specified variables and simple linear regression equations for each plot. This program aids the user in visualizing relationships between variables. Scatter plots also are a good way to present data concisely and clearly. 6D allows the user to specify the size of plots and allows groups of variables to be plotted as one unit. Presenting data as a scatter plot also displays unusual cases or outliers which may indicate an input error.

Suggested Reading Material:

	Ref. No.	Page No.
BMDP Manual	5	8, 9, 133-141
Johnson Report	6	18, 229

MULTIPLE LINEAR REGRESSION (BMDP 1R)

Where the equation for a simple linear regression is of the form $y = ax + b$, the regression equation determined by program 1R for multiple linear regression is

$$y = a + b_1x_1 + b_2x_2 + \ldots b_px_p \qquad (2)$$

Where:

y = dependent variable

$x_1 \ldots x_p$ = independent variables

$b_1 \ldots b_p$ = regression coefficients

a = intercept

If requested, 1R will perform the computations using all the data, subsets of data or groups of data as the independent variables.

Suggested Reading Material:

	Ref. No.	Page No.
BMDP Manual	5	9, 10, 237 to 250
Johnson Report	6	18, 87, 109

POLYNOMIAL REGRESSION (BMDP 5R)

When the Multiple-R square (R^2) determined from BMDP 2R (Stepwise linear regression) is not a high value, this may indicate that a simple linear regression equation does not adequately "fit" the data. When this occurs, a polynomial regression may improve the R^2 value. Program 5R determines the equation of the curve with the best "fit" to the data.

Polynomial Regression Model is:

$$y = a_o + b_1x + b_2x^2 + \ldots b_kx^k \qquad (3)$$

where y = dependent variable

b = regression coefficient

x = independent variable

a = intercept

Suggested Reading Material:

	REF. NO.	PAGE NO.
BMDP MANUAL - Regression	5	9, 10 283-288
Johnson Report	6	18, 87 to 89, 116 to 123

ALL POSSIBLE SUBSETS (BMDP 9R)

Program 9R identifies "best" subsets of independent variables in terms of a certain criterion. (i.e. R^2 value, adjusted R^2, or Mallows Cp). It also identifies alternative good subsets of the independent variables. 9R computes only a small fraction of all possible regressions to find the numerically best subset. The residual analysis of this program is more extensive than other regression programs in BMDP.

Suggested Reading Material:

	REF. NO.	PAGE NO.
BMDP MANUAL	5	9, 10, 264 to 276
Johnson Report	6	18, 87 to 91

BURROUGHS AND BMDP FILE CREATION

Once the type of analysis needed has been determined, the user can then progress to constructing the two data files and one job file needed by the BMDP Statistical Software and the Burroughs B7900 System. If the user is unfamiliar with the Burroughs System operation, contact the Soil Mechanics Bureau's computer liaison for assistance.

The first data file constructed will contain all the variables to be analyzed by the BMDP Programs. Read Sect. 3.2 and 3.3 in the BMDP Manual for help in organizing the data.

For files which will require a large amount of data entry time, contact the data entry unit of the Computer Services Bureau for assistance. Smaller files can be created directly from the terminal. Contact the computer liaison in the Soil Mechanics Bureau or consult the Terminal User's Guide for the Burroughs B7900.

In either case, data should be organized on coding sheets available from the Computer Services Bureau. This will aid the user in formatting the data (See Sect. 3.2 BMDP Manual). When naming this file, it is suggested the naming sequence be:

D/JSD/SOILS/MUD

WHERE:

D = Data File Designation

JSD = User's Initials

SOILS = Users Work Unit

MUD = Name of Soil/Data Group

The second data file is referred to as the "SETUP". This file will contain BMDP commands to specify the type of analyses. Refer to chapters 4 through 7 and the individual program sections of the BMDP manual for explanations of these commands. Also, examples of "SETUP" files for specific BMDP programs are included at the end of this section. The setup file should have the naming sequence:

D/JSD/SOILS/6D/SETUP/MUD

WHERE:

D = Data File Designation

JSD = User's Initials

SOILS = Users work unit

6D = BMDP Program

SETUP = Indicates to user that file contains BMDP commands

MUD = Name of SOIL/DATA Group

Consult the Bureau's Computer Liaison and/or Terminal User's Guide for assistance.

The last file required is the JOB file and contains the system commands (WORK FLOW LANGUAGE) specific to the Burroughs system. When "started", this file initiates the BMDP program, which in turn utilizes the two data files. The naming sequence of this file should be:

J/JSD/SOILS/BMDP/6D/MUD

where:

J = Job File Designation

JSD = User's initials

SOILS = User's work unit

BMDP = Indicates to user this job file utilizes the BMDP Statistical Software

6D = Name of individual program

MUD = Name of SOIL/DATA Group

Examples of these files are included at the end of this guide.

REFERENCES AND READING MATERIAL

1. Statistics Made Simple

   H.T. Hayslett, Jr.
   Doubleday & Co., Inc.
   Dept. MS
   Garden City, New York

2. Statistics

   Lawrence L. Lapin
   Harcourt Brace Jovanovich, Inc. 1980

3. Statistics

   Murray R. Spiegel
   Schaum's Outline Series in Mathematics
   McGraw-Hill Book Co. 1961

4. Statistical Dictionary

   Albert K. Kurtz and Harold A. Edgerton
   John Wiley & Sons, Inc. (Old Edition, 1939)

5. BMDP Statistical Software

   W. J. Dixion 1983 Revised Printing, University of California Press

6. Advanced Statistical Analyses of Cone Penetration Test With Other Geotechnical Parameters

   Robert Johnson, NYSDOT, Soil Mechanics Bureau, 1985

7. An Evaluation of the Thordarson Electronic Piezometer, A Statistical Analyses Study

   John Henkes, NYSDOT, Soil Mechanics Bureau, 1985

8. Burroughs Cande Manual

   February 1984

APPENDIX A

BURROUGHS AND BMDP FILE EXAMPLES

2D-SETUP FILE

```
/PROB    TITLE IS 'TEST DATA MUD '.

/INPUT   VARIABLES ARE 31.
         FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
            F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
            F7.2,2F3.0)'.

         UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.


/PRINT
   STEM.


/END
```

2D-JOB FILE

```
00000100  BEGIN JOB BOB/2D;
00000200  CHARGE = BOT104057016100;
00000210   OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP/2D;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/2D/SETUP/MUD,
00000600                MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800                FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/JSD/SOILS/2D/PRINT,
00000820  %            MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

1M-SETUP FILE

```
/PROB     TITLE IS 'TEST DATA MUD '.

/INPUT    VARIABLES ARE 31.
          FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
             F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
             F7.2,2F3.0)'.

          UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.
/PROC
     LINK = SINGLE.

/PRINT
   CORR.
   NCUT = 8.
/END
```

1M-JOB FILE

```
00000100  BEGIN JOB JUD/1M;
00000200  CHARGE = BOT104057016100;
00000210   OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP/1M;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/1M/SETUP/MUD,
00000600                MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800                FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/JSD/SOILS/1M/PRINT,
00000820  %             MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

4M-SETUP FILE

```
/PROB     TITLE IS 'TEST DATA MUD '.

/INPUT    VARIABLES ARE 31.
          FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
             F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
             F7.2,2F3.0)'.

          UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.
/PRINT
      STAND.

      INV.
      PART.
      FSTR.
       FSCF.
      RESI.
      NCUT = 11.

/END
```

4M-JOB FILE

```
00000100  BEGIN JOB JUDY/4M;
00000200  CHARGE = BOT10405701610O:
00000210    OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP81/4M;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/4M/SETUP/MUD,
00000600                MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700   FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800                FILETYPE=7);
00000810  % FILE FILE6 (KIND=DISK,TITLE=D/JSD/SOILS/MUD/PRINT,
00000820  %             MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

2R-SETUP FILE

```
/PROB     TITLE IS 'TEST DATA MUD '.

/INPUT    VARIABLES ARE 31.
          FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
             F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
             F7.2,2F3.0)'.

          UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPF,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.

/REGRESS DEPENDENT IS ACV.
                              METHOD=F.

/PRINT    FRATIO.
          CORR.


/END
```

2R-JOB FILE

```
00000100  BEGIN JOB JUDY/2R;
00000200  CHARGE = BOT104057016100;
00000210   OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP/2R;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/2R/SETUP/MUD,
00000600                MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800                FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/JSD/SOILS/2R/PRINT,
00000820  %             MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

6D-SETUP FILE

```
/PROB     TITLE IS 'TEST DATA MUD '.

/INPUT    VARIABLES ARE 31.
          FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F5.3,2F5.0,2F5.3,F6.4,F4.0,
             F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
             F7.2,2F3.0)'.
          UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,FP,FF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.

/PLOT               YVAR ARE MC,MC,MC,MC,MC,MC,MC,MC.
                    XVAR ARE UW,GC,EOC,ACV,UWT,LLT,PIT,MCSC.

                    STATISTICS.
                    SIZE IS 40,25.
/END
```

6D-JOB FILE

```
00000100  BEGIN JOB JUDY/6D;
00000200  CHARGE = BOT10405701610O;
00000210   OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000350   PRINTLIMIT = 15000;
00000400  RUN B/BMDP/6D;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/6D/SETUP/MUD,
00000600               MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800               FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/RJJ/SOILS/6D/PRINT,
00000820  %            MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

1R-SETUP FILE

```
/PROB TITLE IS 'TEST DATA ON MUD'.
/INPUT VARIABLES ARE 31.
       FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
          F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
          F7.2,2F3.0)'.
       UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                   MCV,VSTRAIN,VSHEAR,CR,FR.


/REGRESS DEPENDENT IS UWT.
         INDEPENDENT IS LCV,EOT.
/PRINT
     CORR.
     COVA.
     RREG.
/PLOT
     RESID.
     VARIABLES ARE UWT,LCV,EOT.
     NORM.

/END
```

1R-JOB FILE

```
00000100  BEGIN JOB BOB/1R;
00000200  CHARGE = BOT104057016100;
00000210   OPTION = (BDBASE); BDNAME=PAGE/L/2; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP/1R;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/RJJ/SOILS/1R/SETUP/MUD,
00000600                MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/RJJ/SOILS/MUD,
00000800                FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/RJJ/SOILS/1R/PRINT,
00000820  %            MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

5R-SETUP FILE

```
/PROB    TITLE IS 'TEST DATA MUD '.

/INPUT   VARIABLES ARE 31.
         FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
            F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
            F7.2,2F3.0)'.
         UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.
/REGRESS DEPENDENT IS MC.
         INDEPENDENT IS MCC.

/PRINT
      DEGREES = 3.
/PLOT
      DEGREE = 3.
      NORMAL.
      DNORMAL.
      SIZE = 40,25.
/END
```

5R-JOB FILE

```
00000100  BEGIN JOB BOB/5R;
00000200  CHARGE = BOT104057016100;
00000210   OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP/5R;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/5R/SETUP/MUD,
00000600               MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800               FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/JSD/SOILS/5R/PRINT,
00000820  %            MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

9R-SETUP FILE

```
/PROB    TITLE IS 'TEST DATA MUD '.

/INPUT   VARIABLES ARE 31.
         FORMAT IS '(F3.0,3F4.0,2F5.2,F4.3,F6.3,2F5.0,2F5.3,F6.4,F4.0,
            F7.3,F3.0,F5.2,4X,2F5.1,F6.1,F4.0,2F5.3,2F4.0,F5.3,F4.0,F5.2,
            F7.2,2F3.0)'.

         UNIT IS 8.

/VARIABLE NAMES ARE MC,UW,MCC,UWC,GC,EOC,CRC,CCC,PP,PF,LCV,HCV,ACV,MCT,
                    EOT,UWT,GT,LLT,PLT,PIT,CUT,COP7,COPP,PO,MCSC,CSSC,
                    MCV,VSTRAIN,VSHEAR,CR,FR.

/REGRESS DEPENDENT IS CR.
        INDEPENDENT ARE 1,2,5,6,7,8,13,15,16,      29,31.
        METHOD=RSQ.
/PRINT MATRICES ARE CORR,COVA,RREG,CREG,RESI.
        CASE=12.
/PLOT YVAR IS       CR,CR,CR,CR,CR,CR,CR,CR,CR,CR,CR.
      XVAR IS MC,UW,GC,EOC,CRC,CCC,ACV,EOT,UWT,           VSHEAR,FR.
 NORM.
 SIZE=40, 25.
 STAT.
HIST.
/END
```

9R-JOB FILE

```
00000100  BEGIN JOB JUDY/9R/MUD;
00000200  CHARGE = BOT10405701610O;
00000210    OPTION = (BDBASE); BDNAME=PAGE/L/1; DESTNAME = EDPCSRU1;
00000300  % QUEUE = 50;
00000400  RUN B/BMDP/9R;
00000500  FILE FILE5 (KIND=DISK,TITLE=D/JSD/SOILS/9R/SETUP/MUD,
00000600                MAXRECSIZE =14,BLOCKSIZE =420,UNITS=WORDS);
00000700  FILE FILE8 (KIND=PACK,TITLE=D/JSD/SOILS/MUD,
00000800                FILETYPE=7);
00000810  %FILE FILE6 (KIND=DISK,TITLE=D/JSD/SOILS/9R/PRINT,
00000820  %             MAXRECSIZE =22,UNITS=WORDS,PROTECTION=SAVE);
00000900  END JOB
```

00019
LRI